

FlexFunction2Sustain

Project overview & status

Christian May, Fraunhofer FEP, Project Coordinator

M36 meeting, Freising, March 2nd, 2023



This project has received funding from the European Union's Horizon 2020 research and innovation programme under [grant agreement n°862156](#)

A photograph of a beach heavily littered with plastic waste, including numerous water bottles, plastic bags, and other debris. The trash is piled up along the shoreline, extending into the water. The scene is brightly lit, suggesting a sunny day.

FlexFunction2Sustain boosts innovation for sustainable and smart plastic and paper products

➔ to reduce plastic waste

➔ get ready for the digital age

using

nano-functionalization of novel plastic and paper surfaces


OPEN INNOVATION ECOSYSTEM
FOR SUSTAINABLE
NANO-FUNCTIONALIZED
PLASTIC & PAPER
SURFACES & MEMBRANES



FLEX FUNCTION 2 SUSTAIN

- FlexFunction2Sustain project aims at creating an **Open Innovation Test Bed (OITB)** for nano-functionalisation technologies that enable sustainable and smart plastics and paper based products. The ecosystem will support innovative SMEs and industries by drastically reducing the time-to-market for novel concepts, ideas and products.
- Open Call for Pilot Cases
 - Objective: Test Services and Procedures and **Create Success Stories**
 - What you get: Discounted services **up to 100% subsidized support**
 - Available budget: **2.25 M€ for approx. 20 projects**

Target markets



sustainable surfaces & smart packaging
plastic & membranes in bio application
optical films for security & design
plastic films for architecture applications
smart plastics in automotive application



Partnership

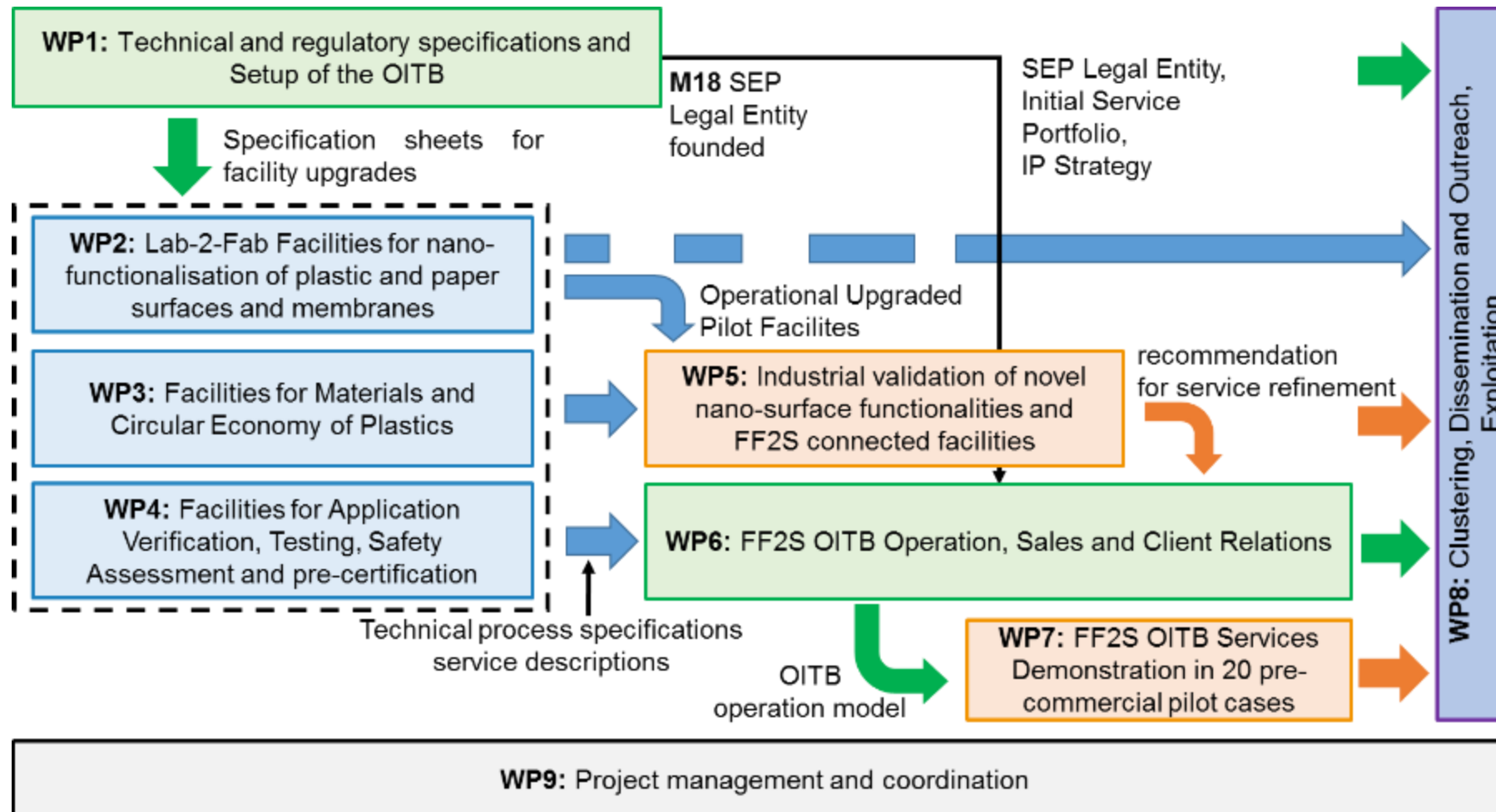
Fraunhofer FEP, Fraunhofer IAP, Fraunhofer IVV, JOANNEUM RESEARCH MATERIALS, BL Nano Biomed, INL, HOPE-A, Capri-Sun, oet, amcor, Coatema, GEMIFO, Gesellschaft für Mittelstandsförderung mbH, SONNENBERG HARRISON, i3, Your Companion Life Science Filtration, CRF, P&G, Itfn Nanotechnology Lab, SONAE MC, AMIRES, HUECK FOLIEN.

www.flexfunction2sustain.eu

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Our work plan towards a sustainable Open Innovation Ecosystem ...



Achievements M19 – M36



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WP2 achievements

Lab-2-Fab Facilities for nano-functionalisation plastic and paper surfaces and membranes



Objectives: Enable processing of biopolymers; increase process reliability and productivity; complete process chain

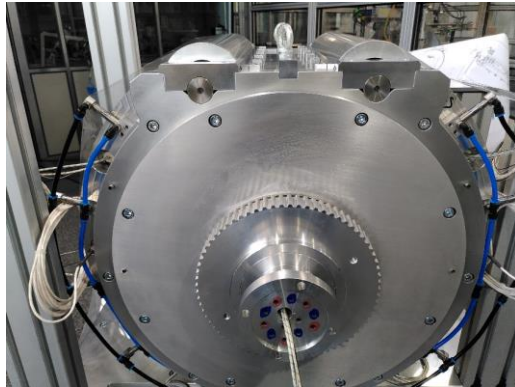
Achievements:

- Slot-Die at FhG-IVV available, used in use cases P&G, Capri-Sun, SONAE, Pilot Cases Sustainpack, Funflex
- R2R ALD reactor for FhG-IVV assembled for mechanical testing at Coatema
- Trials at Coatema for P&G on the LS29 cluster machine – Validation
- Coating unit upgrade installed at Joanneum Research
- Imprint unit and registration unit installed at AUTH

Slot Die at IVV



IVV ALD drum assembled at COA



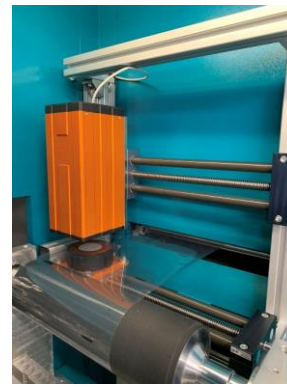
Upgrade JOA



5 Roller coating validated COA



Upgrades installed at AUTH



WP3 achievements

Facilities for Materials and Circular Economy of Plastics

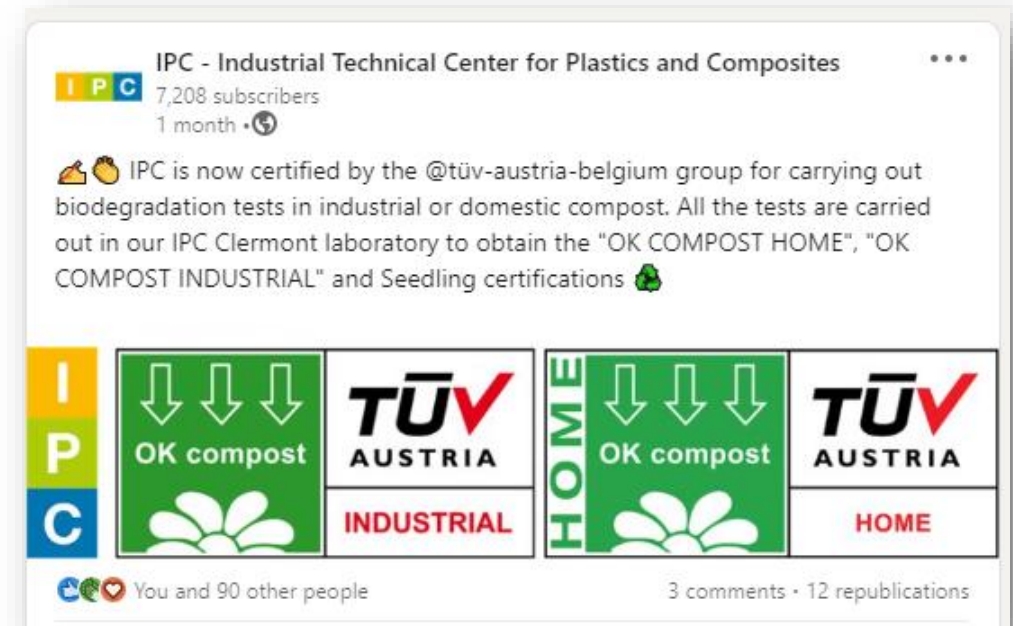
Upgrade of the REMIX Pilot line

- NIR Optical Sorting machine training
- Accreditation of the REMIX line for PP flexible film recyclability evaluation



Upgrade of the BIODEGRADIX Pilot line

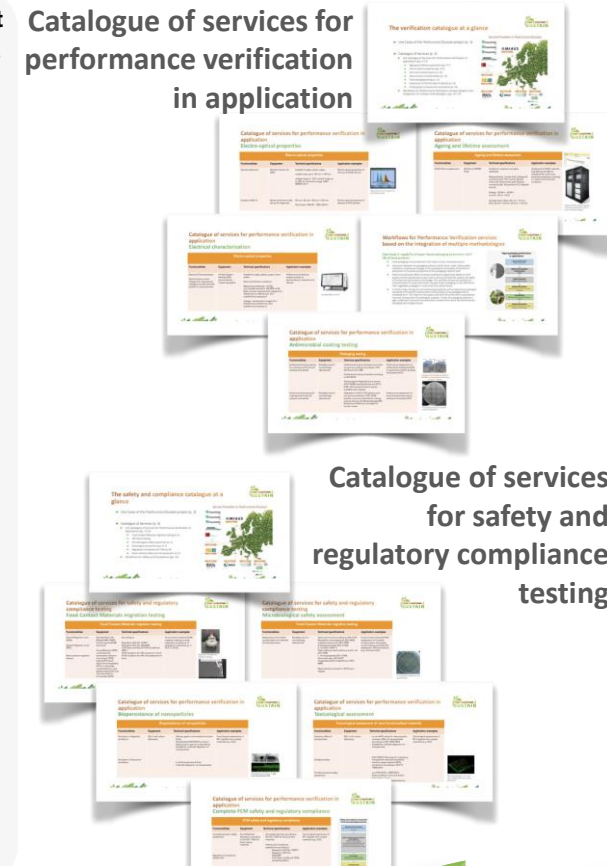
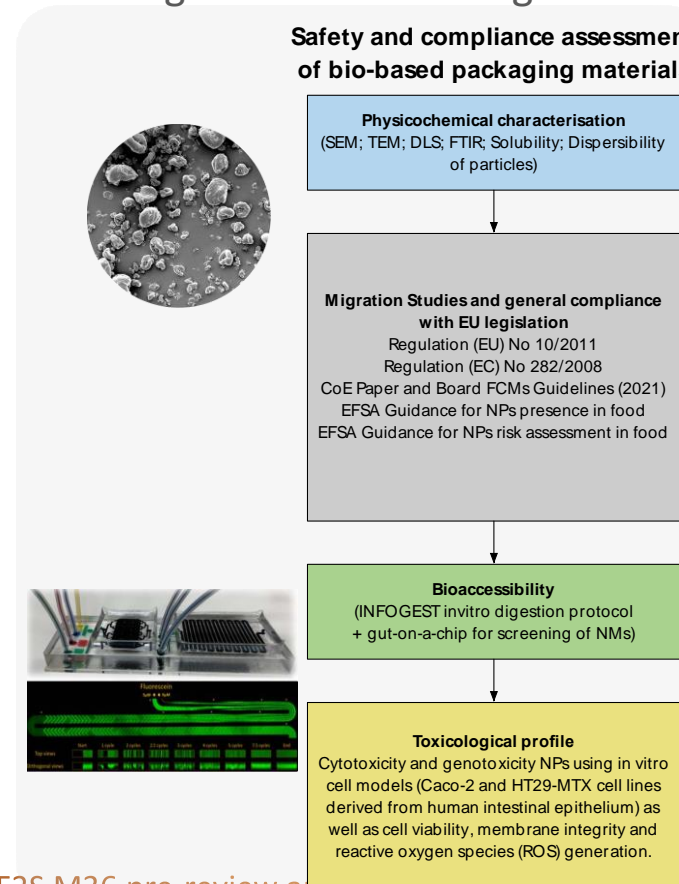
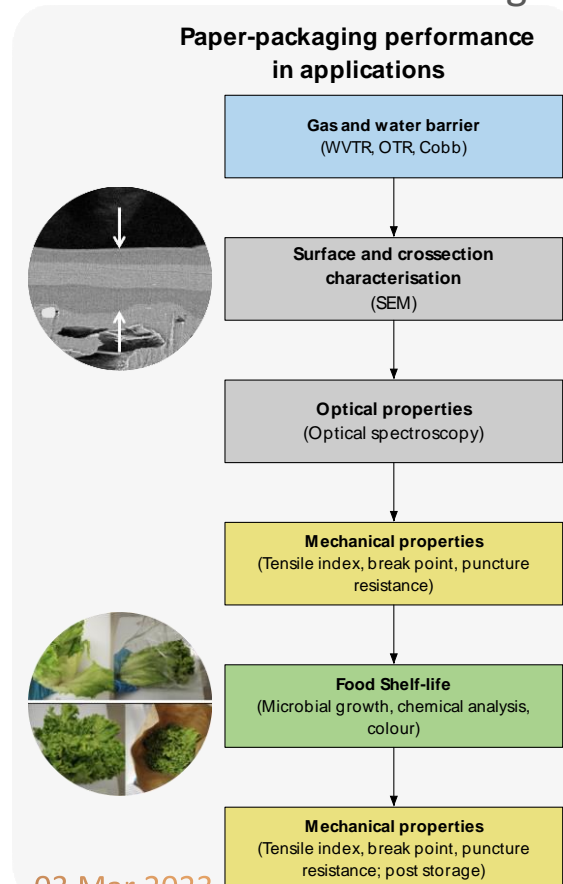
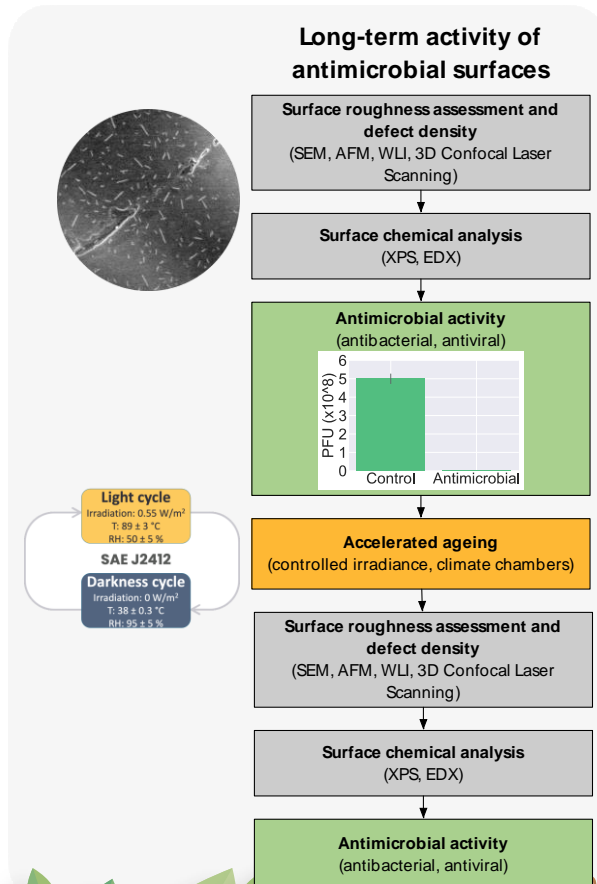
- Correction of OK COMPOST disintegration test
- Biodegradation Line certified for TÜV Austria audit in December 2022



WP4 achievements

Facilities for Application Verification, Testing, Safety Assessment and pre-certification

- Developed and implemented testing methodologies and workflows to evaluate the in-application performance, safety, and compliance of novel nano-functionalised materials.
- Created new FlexFunction2Sustain service Catalogues featuring these methodologies and workflows.



WP5 achievements

Industrial validation of novel nano-surface functionalities and FF2S pilot facilities

6 use cases, 18 partners, 13 upgraded pilot lines






11 type of materials explored: recycled PET film, cellulose based film, monomaterial PP film, PA, PET, PES, PC membrane, (transparent) paper substrate, bio-based resins and coatings (PVOH and Shellac)



Task 5.1: cellulose based optical film for labelling.
FF2S innovation: UV curable bio-based resins



Task 5.2: Paper-based barrier laminate for shampoo sachets.
FF2S innovation: barrier and coating process

	Not packaged	Plastic	Kraft paper - not coated	Transparent paper - Control	Transparent paper - Coated
Day 7					

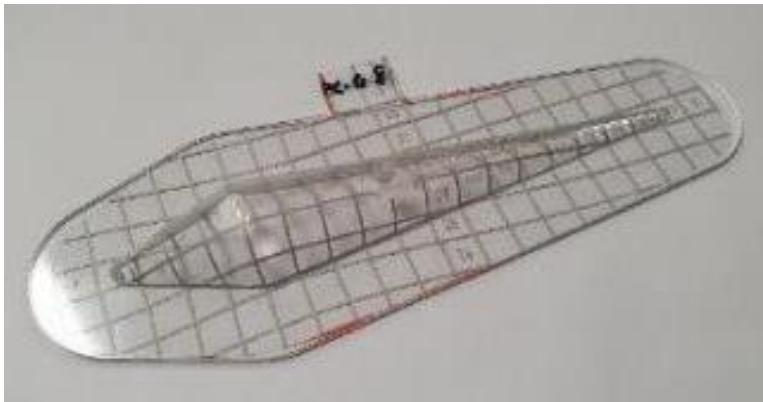
Task 5.5: fresh lettuce not packaged, packaged with plastic or with paper after 7 days in refrigerated conditions (3.7 °C / 74% RH).
FF2S innovation: bio-based barrier coating on transparent paper

WP5 achievements

Industrial validation of novel nano-surface functionalities and FF2S pilot facilities

12 processes explored: R2R UV-NIL, metallisation coating, wet coating, transfer coating, lamination on paper, sputtering, ALD, vacuum coating, laser scribing, thermo-forming, spray coating, and printing

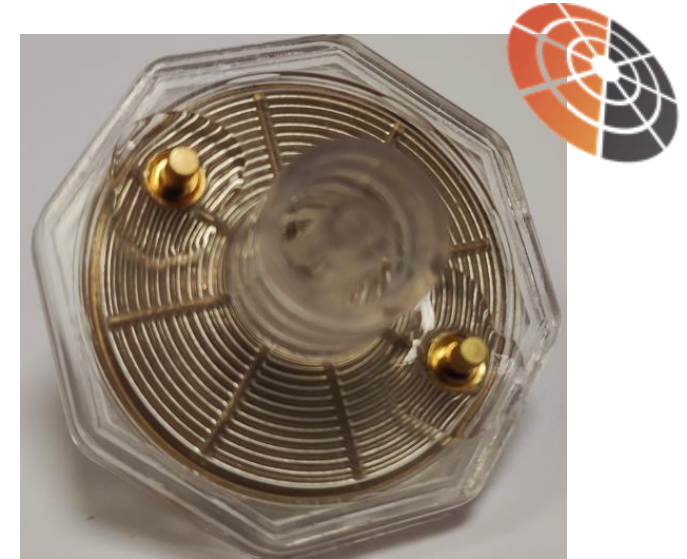
6 products' end of life strategies explored: home and industrial compostability, sorting and recycling (RecyClass protocol), degradation in marine environment, and Au recovery



Task 5.4: mould for the CRF dashboard component. *FF2S innovation: anti-scratch and anti-reflective features achieved*



Task 5.6: from the PET/Alu/PE multimaterial to the FF2S mono-PP pouch. *FF2S innovation: positive results from sorting and recycling trials*

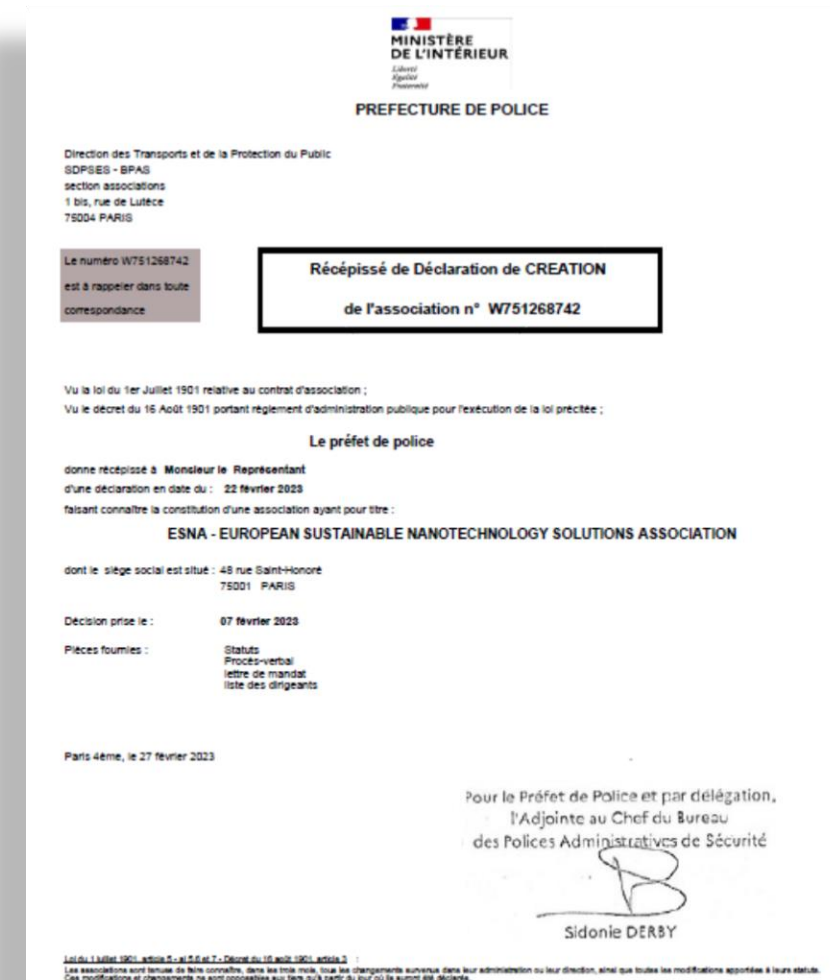


Task 5.3: Switchable syringe filter with gold coated membrane. *FF2S innovation: Au recovery (99,6%)*

WP1/6 achievements

Technical and Regulatory specifications and Setup of the OITB FF2S OITB Operation, Sales and Client Relations

- **OITB Business & Sustainability Plan**
 - three level business model: Members ↔ association ↔ [SEP]
- **OITB Structure**
 - non-profit French 1901 association as collaborative network of experts
- **SEP ↔ OITB Interaction**
 - framework / “franchise” contracts with independent for-profit companies!
- **OITB Standard Operation Procedures**
 - completed Process Set for Implementation within WP6
- **Association statues approved and association registered:
European Sustainable Nanotechnology Solutions Association - ESNA**
- Ecosystem platform under construction
- Client database and CRM will be established in next few months
- Standard Service Portfolio is being defined
- Investor relations work being established
- Some patent searches carried out
- Tender for SEP finalised



MINISTÈRE DE L'INTÉRIEUR
Liberté
Égalité
Fraternité

PREFECTURE DE POLICE

Direction des Transports et de la Protection du Public
SDPSES - BPAS
section associations
1 bis, rue de Lutèce
75004 PARIS

Le numéro W751268742
est à rappeler dans toute
correspondance

Récépissé de Déclaration de CREATION
de l'association n° W751268742

Vu la loi du 1er Juillet 1901 relative au contrat d'association ;
Vu le décret du 16 Août 1901 portant règlement d'administration publique pour l'exécution de la loi précitée ;

Le préfet de police

donne récépissé à **Monsieur le Représentant**
d'une déclaration en date du : **22 février 2023**
faisant connaître la constitution d'une association ayant pour titre :
ESNA - EUROPEAN SUSTAINABLE NANOTECHNOLOGY SOLUTIONS ASSOCIATION

dont le siège social est situé : 48 rue Saint-Honoré
75001 PARIS

Décision prise le : **07 février 2023**

Pièces fournies : Statuts
Procès-verbal
lettre de mandat
liste des dirigeants

Paris 4ème, le 27 février 2023

Pour le Préfet de Police et par délégation,
l'Adjointe au Chef du Bureau
des Polices Administratives de Sécurité

Sidonie DERBY

Loi du 1er juillet 1901 relative au contrat d'association - Décret du 16 août 1901 relatif à l'exécution de la loi précitée
Les associations sont tenues de être convoquées, dans les trois mois, sous les changements survenus dans leur administration ou leur direction, ainsi que toutes les modifications apportées à leurs statuts.
Ces modifications et changements ne sont opposables aux tiers qu'à partir du jour où la assemblée est déclarée.

WP7 achievements

Open Call for Pilot Case projects



sustainable smart packaging
 surfaces & membranes in bio application
 plastic & paper electronics
 optical films for security & design
 plastic films for architecture applications
 smart plastics in automotive application

🟢 **Launched:** Sep 2021

- 🟢 **1st cut-off :** 4 Pilot Cases (out of 5 submitted) selected;
- 🟢 **2nd cut-off :** 5 Pilot Cases (out of 8 submitted) selected;
- 🟢 **3rd cut-off :** 11 Pilot Cases submitted (10 eligible). 8 pre-selected;

Why:

Access to all major nano-functionalisation techniques for plastic and paper surfaces

Customized support through a unique and complete set of services

Who:

SMEs & start-ups
Large industries

EU Member States & associated countries

When:

1st cut-off:
28th January 2022

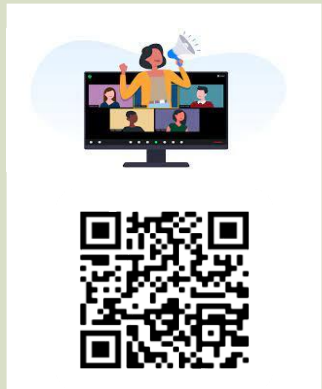
2nd cut-off:
29th July 2022

3rd cut-off:
27th January 2023

How much:

2.25 M €
overall budget
up to €130K
financial support per Pilot Case
70%
covered by FF2S





How:








WP7 achievements

Open Call for Pilot Case projects

1st cut-off : 4 Pilot Cases selected

Proposal N	Acronym	Proposal full name	Company
20220125-0011	IDOLES	Improvement of durability by optimizing Low Energy Surface	Infrascreen 
20220126-0017	FUNFLEX	Surface functionalization of Circular flexible food packaging	LEYGATECH 
20220131-0018	SUSTAINPACK	Sustainable Packaging	HPX Polymers 
20220128-0016	DCC	Dispersion Coating Compostable	Cartiera Rivignano 

2nd cut-off : 5 Pilot Cases selected

Proposal N	Acronym	Proposal full name	Company
20220728-0027	ENLIGHTENMENT	Functionalisation of agricultural films with multi-season fluorescent dye to enhanced plant development	CASCADE 
20220809-0032	POSIDONIA	Hydrophobic & UV-protective films for Sustainable panels based on natural waste fillers and bio-base	PHEE Private Company 
20220725-0022	POSEIDON	Pouch made of cellulose for liquid container applications	ARJOWIGGINS 
20220805-0030	BIOESS	Barrier Improved Ovtene for Environmentally Sustainable Strategies	ARCADIA SPA 
20220812-0033	RECYBIB	Fully Recyclable Monomaterial Bag-in-Box	Smurfit Kappa Bag-in-Box 

3rd cut-off : applicants from

Geographical representation of the applicants in FlexFunction2Susain Open call for Pilot Cases



WP8 achievements

Clustering, Dissemination and Outreach, Exploitation

- Visual Identity and Dissemination of the Project and OITB Idea**
 - Visibility at F2F events e.g., ICEFPE22 & AGRIVOLTAICS 2022, All4Pack, LOPEC 2023
 - FF2S in Press and Media announcing the project outcomes
 - Webpage & Dissemination materials updated
- Clustering with other OITB & NanoSafetyCluster**
 - Regular bilateral exchange: NGM, SNMT, NewSkin, MDOT
 - 3rd OITB annual workshop 2023 on 14 Jun, Lund, Sweden – as a satellite event of EuroNanoForum2023, in planning with SNMT
- Interaction with thematic associations and intermediaries**
 - OE-A Working Group Encapsulation
 - EUPC, LINPRA, NanoSafetyCluster → EAB Members
- Standardisation and Regulation Activities**
 - 4 standards projects on biodegradable plastics with direct FF2S participation
- Contributions to FlexFunction2Sustain Open Calls**
 - Marketing activities for disseminating the last cut-off, announcement of cut-off #2 winners, introduction of cut-off #1 Pilot cases
 - Call promotion by FF2S partners for the local markets

ICEFPE22 & AGRIVOLTAICS 2022
10-12 Oct 2022, Athens, Greece



Open call webinar, 30 Nov 2022



Consortium Partners
exhibiting
at LOPEC 2023



IPC booth at All4Pack,
21-24 Nov 2022, Paris Nord Villepinte



Focus topics for next months

- Let us start the final year of the Flexfunction2Sustain funded project period
 - We have to work on the successful transition to a sustainable OITB business by ESNA
 - Very next step: SEP: call for tender and SEP selection and contracting
- Continuous work in WP2, 3, 4, 5
 - Make our use case partners happy in a fruitful cooperation
 - Complete the machine upgrades to be prepared for future cases
- WP7 – Pilot cases
 - Cut-off 1: ongoing work in time
 - Cut-off 2: fast JIA processing and kick-offs
 - Cut-off 3: selection of pilot cases, fast JIA processing and budget alignment
- Finalization of Amendment #2, preparation of Amendment #3
- Project Review on June 7th (online)



**Thank You
for listening!**



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